

## Rules for the use of significant digits.

- 1) All non zero digits are significant.
- 2) Zeros to the right of a non zero digit but to the left of the decimal are NOT significant.  
150000 has only 2 sig. digits
- 3) Zeros to the left of a non zero digit and to the right of the decimal are NOT sig.  
0.00000561 has only 3 sig. digits.
- 4) Zeros between two non-zero digits ARE significant.  
500350 has 5 sig. digits.
- 5) Zeros to the right of the decimal point preceded by a nonzero digit ARE significant.  
65.00 has 4 sig. digits and 0.040 has 2 sig. digits
- 6) In the laboratory record all of the sig. digits possible but do not make up any that you can not duplicate with that particular piece of equipment. Conversion factors have an infinite number of sig. digits.  
The electronic balance is accurate to  $\pm 0.01g$ .  
The 10mL graduated cylinders are accurate to  $\pm 0.1mL$ .  
It is permissible to estimate one digit beyond the smallest marking on the equipment except for digital readings..

**Atlantic-Pacific Rule:** for determining the number of significant digits

Examples:

**\*\*Decimal Absent:** start counting from the first nonzero digit on the Atlantic side  
10600 3 sig

**\*\*Decimal Present:** start counting from the first nonzero digit on the Pacific side  
10600. 5 sig.

Conversion factors have an infinite number of significant digits.

## Math operations using SIGNIFICANT DIGITS:

- 1) When adding or subtracting, the final answer can only be as accurate as the least precise measurement. (round off the final answer)

$$\begin{array}{r} 161.05 \\ 15 \\ +30.7 \\ \hline \end{array}$$

$$206.75 = 207$$

$$\begin{array}{r} 246.0 \\ - 6.72 \\ \hline \end{array}$$

$$239.28 = 239.3$$

- 2) When multiplying or dividing, the final answer can have only as many sig. digits as the measurement that has the fewest number of significant digits. (round off answer)

$$(2.1)(516) = 1083.6 = 1100 \quad 14.00/3.37 = 4.15430 = 4.15$$

## Percent calculations:

% = your value divided by the correct value times 100

% error =  $100 - \text{your \%}$  or %error = (amount off/total)(100)

PROBLEM:

What percent is 42.0 out of 50.0?

$$\frac{42.0}{50.0} \times 100 = 84.0\%$$

What is the percent error?

$$\left( \frac{50.0 - 42.0}{50.0} \right) 100 = 16\% \text{ error}$$

$$\text{OR} \quad \frac{100.0 - 84.0}{84.0} = 16.0\% \text{ error}$$